WE CLAIM:

1. A data acquisition and telemetry system, comprising:

(a) at least one probe in communication with at least one medium of interest; and

(b) a reader, said reader transmitting at least one excitation signal having at least an energy component to said at least one probe, said at least one probe using said energy component of said excitation signal to:

(i) measure at least one parameter of said at least one medium of interest; and

(ii) transmit at least one data signal, said at least one data signal being received by said reader.

2. The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal comprises a digital carrier signal modulated to indicate a measured value of said at least one parameter.

3. The data acquisition and telemetry system according to Claim 2, wherein said digital carrier signal is at least frequency modulated.

4. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal comprises a modulated carrier signal.

5. The data acquisition and telemetry system according to Claim 1, wherein said at least one data signal has a frequency corresponding to a measured value of said at least one parameter.

6. The data acquisition and telemetry system according to Claim 1, wherein said energy component of said at least one excitation signal comprises radio frequency energy.

7. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially different frequencies.

8. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal and said at least one data signal have substantially equal frequencies.

9. The data acquisition and telemetry system according to Claim 8, wherein said reader comprises blocking circuitry, said blocking circuitry substantially preventing said at least one excitation signal transmitted by said reader from being received by said reader.

10. The data acquisition and telemetry system according to Claim 1, wherein said at least one medium of interest comprises soil.

11. The data acquisition and telemetry system according to Claim 10, wherein said at least one parameter comprises moisture content of said soil.

12. The data acquisition and telemetry system according to Claim 10, wherein said at least one parameter comprises soil matrix water potential.

13. The data acquisition and telemetry system according to Claim 1, wherein said at least one probe and said reader each comprise respective means for receiving and transmitting signals, said respective means for receiving and transmitting signals cooperating with each other to establish an inductive couple between said at least one probe and said reader, said inductive couple facilitating at least transfer of data and energy between said at least one probe and said reader.

14. The data acquisition and telemetry system according to Claim 13, wherein each of said respective means for receiving and transmitting signals comprises at least one transmit/receive coil.

15. The data acquisition and telemetry system according to Claim 13, wherein each of said respective means for receiving and transmitting signals comprises at least one antenna.

16. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal is selectively transmitted by said reader.

17. The data acquisition and telemetry system according to Claim 1, wherein said reader converts said at least one data signal to corresponding moisture content data.

18. The data acquisition and telemetry system according to Claim 1, wherein said at least one excitation signal further comprises a data component.

19. The data acquisition and telemetry system according to Claim 18, wherein said data component comprises at least one instruction for execution by said at least one probe.

20. A data-acquisition-and-telemetry control system for facilitating substantially real-time management of an object system, comprising:

(a) at least one probe in communication with at least one medium of interest;

(b) a reader; and

(c) a control module,

wherein, said reader transmits an excitation signal having at least an energy component to said at least one probe, said at least one probe using said energy component to measure at least one parameter of said at least one medium of interest and to transmit a data signal received by said reader, said reader generating, and then transmitting to said control module, at least one set of instructions corresponding to said data signal received from said at least one probe, said control module converting said at least one set of instructions into at least one control signal, and said control module transmitting said at least one control signal to the object system so as to cause a corresponding response by the object system.

21. The data-acquisition-and-telemetry based control system according to Claim 20, wherein said excitation signal comprises a modulated carrier signal.

22. The data-acquisition-and-telemetry based control system according to Claim 20, wherein said excitation signal further comprises a data component.

23. The data-acquisition-and-telemetry based control system according to Claim 20, wherein said data signal comprises a modulated carrier signal.

24. The data acquisition and telemetry control system according to Claim 20, wherein said at least one probe and said reader each comprise respective means for

receiving and transmitting signals, said respective means for receiving and transmitting signals cooperating with each other to establish an inductive couple between said at least one probe and said reader, said inductive couple facilitating at least transfer of data and energy between said at least one probe and said reader.

25. The data acquisition and telemetry system according to Claim 24, wherein each of said respective means for receiving and transmitting signals comprises at least one transmit/receive coil.

26. The data acquisition and telemetry system according to Claim 24, wherein each of said respective means for receiving and transmitting signals comprises at least one resonant antenna.

27. The data acquisition and telemetry system according to Claim 20, wherein said reader further comprises a data link, said data link facilitating download of data obtained from said data signal to at least one remote site.

28. The data acquisition and telemetry system according to Claim 20, wherein said at least one remote site comprises a website on a global computer network.

29. The data acquisition and telemetry system according to Claim 20, further comprising a feedback loop between said control module and the object system, said control module using said feedback loop at least to monitor object system responses.

30. A probe for use in conjunction with a reader to facilitate measurement of moisture content of soil, comprising:

(a) a body; and

(b) at least one electronic circuit attached to said body and being in operative communication with the soil, said at least one electronic circuit using an energy component of an excitation signal transmitted to the probe by the reader to measure the moisture content of the soil and to transmit a data signal to the reader, said data signal indicating the moisture content of the soil.

31. The probe according to Claim 30, wherein said at least one electronic circuit comprises at least one energy storage capacitor, said at least one energy storage capacitor storing energy from said energy component and releasing stored energy when said stored energy reaches a predetermined level so as to cause at least a portion of said at least one electronic circuit to resonate and transmit said data signal, said data signal having a frequency substantially different than that of said excitation signal.

32. The probe according to Claim 30, wherein said energy component causes said electronic circuit to resonate so that said data signal transmitted by said at least one

electronic circuit has a frequency substantially equal to a resonant frequency of said at least a portion of said at least one electronic circuit.

33. The probe according to Claim 32, wherein said at least one electronic circuit comprises an inductive loop and a moisture sensing capacitor.

34. The probe according to Claim 33, wherein said moisture sensing capacitor has a capacitance which varies according to the moisture content of the soil so that said resonant frequency of said at least one electronic circuit is primarily determined by said capacitance of said moisture sensing capacitor.

35. The probe according to Claim 30, wherein said at least one electronic circuit comprises a variable frequency oscillator, said energy component causing said variable frequency oscillator to resonate so as to produce said data signal, said data signal having a frequency substantially equal to a resonant frequency of said variable frequency oscillator.

36. The probe according to Claim 35, wherein said variable frequency oscillator comprises at least one moisture sensing capacitor having a capacitance which varies according to the moisture content of the soil proximate to the probe so that said resonant frequency of said variable frequency oscillator is primarily determined by said capacitance of said moisture sensing capacitor.

37. The probe according to Claim 36, wherein said moisture sensing capacitor comprises a hydrophilic dielectric.

38. The probe according to Claim 37, wherein said hydrophilic dielectric of said moisture sensing capacitor substantially comprises said soil.

39. The probe according to Claim 30, wherein said at least one electronic circuit comprises at least one moisture sensing capacitor having a capacitance which varies according to the moisture content of the soil, and said moisture sensing capacitor producing a discharge signal analogous to the moisture content of the soil so as to facilitate production of said data signal.

40. The probe according to Claim 39, wherein said at least one electronic circuit converts said discharge signal of said capacitor into a carrier signal and modulates said carrier signal so as to produce said data signal.

41. The probe according to Claim 30, wherein said at least one electronic circuit demodulates a data component of said excitation signal so as to extract at least one instruction from said data component.

42. A moisture mapping system for facilitating a substantially real-time determination of moisture content of a zone of interest, comprising:

(a) at least one probe in communication with the zone of interest;

(b) a reader selectively transmitting an excitation signal to said at least one probe, said at least one probe using an energy component of said excitation signal to measure the moisture content of the zone of interest and to transmit a corresponding data signal to said reader, said corresponding data signal indicating the moisture content of the zone of interest, said reader processing said data signal so as to determine a corresponding value of the moisture content of the zone of interest, said reader storing said corresponding value of the moisture content of the zone of interest, said corresponding value of the moisture content of the zone of interest comprising a moisture map of the zone of interest; and

(c) means for transporting said reader throughout the zone of interest so as to place said reader in operative communication with said at least one probe.

43. The moisture mapping system according to Claim 42, wherein said excitation signal and said data signal are digital, and said processing of said data signal by said reader comprises demodulation of said data signal.

44. The moisture mapping system according to Claim 42, wherein said data signal has a frequency corresponding to the moisture content of the zone of interest, and said reader converts said frequency of said data signal into said corresponding value of the moisture content of the zone of interest.

45. The moisture mapping system according to Claim 42, wherein said means for transporting said reader comprises an irrigation system.

46. The moisture mapping system according to Claim 42, wherein said reader and said at least one probe each comprise a respective transmit/receive antenna, said respective transmit/receive antennas cooperating to facilitate formation of an inductive couple between said reader and said at least one probe, said inductive couple facilitating transfer of at least data and energy between said reader and said at least one probe.

47. A precision irrigation system for facilitating substantially real-time moisture content evaluation and irrigation of an agricultural field, comprising:

(a) a plurality of probes in operative communication with the agricultural field;

(b) a reader, said reader transmitting an excitation signal to said plurality of probes, an energy component of said excitation signal causing each probe that receives said excitation signal to determine moisture content of soil proximate to said each probe, respectively, and said energy component causing said each probe to transmit a data signal corresponding to said moisture content to said reader;

(c) a mobile irrigation structure having a plurality of nozzles attached thereto, said plurality of nozzles being in fluid communication with a water source, and said mobile irrigation structure transporting said reader throughout the agricultural field

so as to facilitate operative communication between said reader and said plurality of probes; and

(d) a control module in operative communication with said reader and with said plurality of nozzles, said control module sending at least one control signal to said plurality of nozzles so as to regulate flow of water therefrom, said control signals corresponding to moisture content data gathered by said reader from said plurality of probes.

48. The precision irrigation system according to Claim 47, wherein said mobile irrigation structure comprises a center pivot irrigation system.

49. The precision irrigation system according to Claim 47, wherein said mobile irrigation structure comprises a linear move irrigation system.

50. The precision irrigation system according to Claim 47, wherein each of said plurality of nozzles is configured for individual control.

51. The precision irrigation system according to Claim 47, wherein said excitation signal further comprises a data component, said data component carrying at least one instruction from said reader to said plurality of probes.

52. The precision irrigation system according to Claim 47, wherein said excitation signal and said data signal are digital.

53. A method for facilitating substantially real-time management of an object system, comprising the steps of:

(a) placing at least one probe in communication with a medium of interest;

(b) establishing an inductive couple between said at least one probe and a reader;

(c) transmitting at least energy from said reader to said at least one probe by way of said inductive couple, said energy causing said at least one probe to measure at least one parameter of said medium of interest and to transmit at least a data signal to said reader by way of said inductive couple, said data signal indicating a measured value of said parameter;

(d) processing said data signal received by said reader so as to extract at least said measured value of said parameter;

(e) using said measured value of said parameter to generate at least one set of instructions;

(f) translating said at least one set of instructions into at least one control signal; and

(g) transmitting said at least one control signal to the object system so as to cause at least one corresponding response by the object system.

54. The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said reader into operative communication with said at least one probe.

55. The method according to Claim 53, wherein establishment of said inductive couple is facilitated by transporting said at least one probe into operative communication with said reader.

56. The method according to Claim 53, wherein at least steps (b) through (f) are performed substantially in real time.

57. The method according to Claim 53, wherein steps (b) through (f) are performed substantially continuously.

58. The method according to Claim 53, further comprising the step of monitoring said at least one corresponding response by the object system.

59. The method according to Claim 53, further comprising the step of using said reader to transmit data to said at least one probe by way of said inductive couple so as to facilitate control of said at least one probe by said reader.

60. The method according to Claim 53, wherein said step of processing said data signal received by said reader comprises demodulating said data signal.

61. The method according to Claim 53, wherein at least steps (b) and (c) occur substantially simultaneously.

62. A soil moisture sensor for measuring moisture content of soil in an agricultural field, comprising:

(a) a plurality of probes, each of said plurality of probes having an electronic circuit with a moisture sensing capacitor in operative communication with the soil, each said moisture sensing capacitor having a hydrophilic dielectric so that capacitance of each said moisture sensing capacitor varies so as to at least indirectly correspond to the moisture content of the adjacent soil, and each of said plurality of probes having a tuned circuit receive/transmit antenna; and

(b) a reader, said reader having at least one tuned circuit receive/transmit antenna selectively transmitting a digital excitation signal to each said tuned circuit receive/transmit antenna of said plurality of probes, said digital excitation signal cooperating with said at least one tuned circuit receive/transmit antenna of said reader and respective tuned circuit transmit/receive antennae of said plurality of probes so as to facilitate establishment of an inductive couple between said reader and said plurality of probes, an energy component of said digital excitation signal energizing at least a portion of each of respective said electronic circuits so that respective said moisture

sensing capacitors each produce an analog signal corresponding to the moisture content of the adjacent soil, each of said plurality of probes then converting respective said analog signals to respective digital carrier signals and modulating said respective digital carrier signals so as to produce a digital data signal indicating moisture content of the adjacent soil, each of said plurality of probes then using respective said transmit/receive antennae to transmit respective said digital data signals to said reader.